The Journal

OF THE AMERICAN SOCIETY OF SAFETY ENGINEERS

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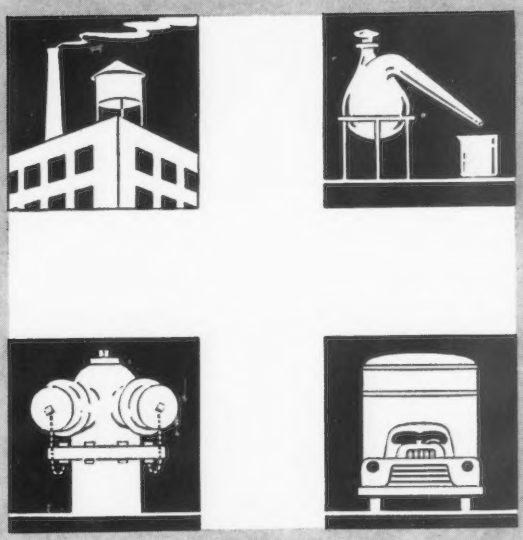

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FIRST article in this issue of the Journal discusses a topic which, we think, deserves more attention from many members of the safety engineering profession. "The Camera — Professional Safety Tool" by Edward S. Greene (page 50) gives basic information on the types of cameras available and how they can be used effectively in personalizing industrial safety programs . . . In "How Important Is Housekeeping?" (page 55) Myron L. Miller shows the results of a study on causes of injuries in one plant . . . Nicholas P. Stumpf points out, in his article (page 61), the need for training courses in home workshop safety to meet the tremendous increase, during recent years, of "do-it-yourself" activity . . . This Journal issue marks the completion of the second year for this Society publication. In these two years the Journal has tried — and successfully, we hope — to bring its readers articles of the highest quality. To maintain this quality the Journal has a continuing need for good manuscripts from its readers, based on their research and experience in their profession.—The Editor

Our President Speaks on SAFETY

THE U.S.S.R.'s successful launching of an earth satellite on October 4 has made all of us aware of that country's great scientific and technical strength. The relative positions of Russia and the United States in the world's technological leadership are in question. And it has become obvious that the security of our nation demands increasing concentration on the development of scientists and engineers to step up our rate of technological advancement.

The need for more and better trained engineers reaches into every area of industrial development and production. Most certainly it includes that professional group represented by the American Society of Safety Engineers, for it has been well established that safety is closely related to production efficiency.

The Society, of course, has been working for many years to raise the standards of the safety engineering profession. It has encouraged its members to increase their knowledge through research and study. It has helped colleges and universities to develop courses in safety engineering. It has provided counseling to interest students in preparing themselves for a career in this important field.

All of these activities have brought gratifying results and, naturally, will be continued. But our efforts of the past must be greatly expanded to meet today's needs. The pressures of an uneasy world for accelerated technological development in the United States call for a special emphasis in the providing of safety engineers who are qualified to deal with the tremendous scientific progress of modern times.

Where are these new, dedicated, highly trained safety engineers to come from? They are to come, of course, from that group which is the hope of every civilization—the youth.

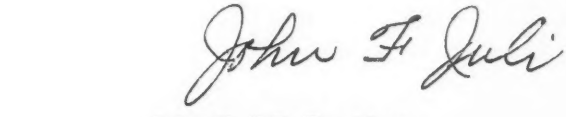
During the coming year the American Society of Safety Engineers will be concentrating on a program to make the youth of America safety-minded, to teach them the fundamentals of safety engineering and to encourage their choice of safety engineering as their profession.

Already we are working with the Boy Scouts of America in the 1958 special emphasis program, "Safety Good Turn." We have mailed literature to Society chapters showing them how they can assist the Scout safety programs in their localities. We have supplied the Scout national headquarters with lists of our national and chapter officers and have volunteered our complete co operation with this worthy undertaking.

For some years a number of our Society chapters have worked with local Junior Achievement organizations, making safety inspections of JA companies, training their safety directors and helping them set up company safety programs. We will expand this activity in 1958 by urging all chapters to offer their services to JA and by giving the full assistance of our national office to JA both through our chapters and directly. From these JA companies will come, we hope, many of the safety engineers of tomorrow.

A further youth project for the Society during the coming year will be the publication of a special promotional book on careers in safety engineering. This material, which will be directed to the high school and beginning college students who are about to choose their life work, will point out the personal opportunities in safety engineering, the value of the profession to industry and to humanity and the educational background needed to become a successful safety engineer.

These are our special goals for 1958. We urge all safety engineers to join in our program.



John F. Juli, President
American Society of Safety Engineers

The CAMERA professional safety tool

by Edward S. Greene

The industrial safety engineer can give a "lift" to his accident prevention program if he knows how to take good photographs and how to use them effectively.

POLAROID

FILM-PACK

35MM

Edward S. Green is field supervisor for Aetna Casualty and Surety Company, where he has been employed in safety engineering since 1934. He is the author of a number of magazine articles and a manual on safety in the textile industry and is a member of ASA's Textile Safety Code Committee. Mr. Green is a registered professional engineer in the State of Georgia.

ENGINEERING, design, teaching, accounting, psychology, statistics . . . there seems to be practically no end to the professional skills the industrial safety engineer must practice in the routine performance of his duties.

And still another special field of knowledge—photography—is being added with increasing frequency by safety engineers who seek to build and maintain employe interest in plant accident control measures.

Use of a camera can personalize and provide a stimulating change of pace for the safety program. The expense normally is not prohibitive and the necessary technique is not difficult to master.

In general, there are three types of camera that can be used. But the ways in which they can be used are limitless. If the budget will stand it, by all means get all three. If not, start with one that applies best to your program and plan to get the most you can out of it.

Tells Advantage of Polaroid Camera

First, there is the Polariod camera. This is the one that gives you a print 60 seconds after you snap the shutter, and it comes in two sizes, giving you a print either 2¾" x 3½" or 3¼" x 4¼".* Its main disadvantage is that, in its present state of development, it gives you no usable negative. If you want more than one print of any picture, you have the choice either of making as many separate pictures as you need or of sending your print to a laboratory for processing, which will give you a film negative and as many prints as you want in

**EDITOR'S NOTE: In mid-September the Polaroid manufacturer announced the availability of special film for the larger cameras for the making of 2¼" x 2¼" and 3¼" x 4" slides (developing time, two minutes). Smaller slides require special projector but larger transparencies may be used in standard lantern slide projectors and some overhead projectors. A few inexpensive items of special equipment are needed.*

almost any size you want. The cost and time required for reprints may be unsatisfactory to you. On the other hand, this may be outweighed by the advantage that, if you don't like the picture you take the first time, you will know it within a minute and can try immediately to get a more satisfactory photograph.

The Polaroid is a natural for on-the-spot evidence "right now." For recording the temporary unsafe condition, the instantaneous unsafe practice, and bringing the evidence to a safety or foremen's meeting a few minutes later, it can't be beat. Taking a picture one month and showing it at a meeting a month later is one thing. Showing the picture at a meeting the same day is something else—with a punch that can't be easily ducked with alibis or denials.

You also can have some fun with this camera. Suppose that just before a foremen's meeting you spot a hazard in the plant. You take a close-up with the Polaroid, blocking out by composition or actual trimming of the print surrounding areas that would tend to make it easy to identify the department and locate the exact area. During the meeting you pass the picture around—possibly mounted on an 8½" x 11" sheet for easy handling—explain that you took it just a few minutes earlier and ask the foreman responsible for the department to claim it. When this has been done, you challenge him to get the condition corrected as soon as possible. In most plants, this little game develops some good natured kidding and competition, providing the fun that is lacking in too many safety programs.

A word of warning: you may find, as plant personnel see how the Polaroid camera works, that an occasional employe will ask you to take his or her picture while operating his machine, while standing alongside it or in some other pose. If your company policy permits such favors, you will find no better way to cement relations with the people. It should go without saying—but it doesn't—that such pictures should be taken with extreme discretion. Remember that the camera sees practically everything—a great deal more than the man who snaps the shutter—and sometimes what it sees is not particularly complimentary to management or the employe. So choose your background with care for this personal shot and scrutinize the photo closely before you turn it over to the employe.

Explains Value of Film-Pack Camera

Where an absolute minimum of time between exposure and finished print is not essential to your use of the camera, a larger camera using cut film and film pack may have certain advantages. And if you have immediate access to a photographic laboratory—possibly within the plant—the time element is reduced even further.

One of the advantages of this type of camera, with a negative measuring 2¼" x 3¼" or larger, is the possession of a film negative that can give you a high grade enlargement in any quantity. It is the camera best suited for publicity pictures for your house organ, trade magazine or local newspaper. It also can be used within the plant for safety pictures to be used at meetings, for general personal discussion, for progress reports and for the record. The price range in this class of camera is great, but a good one is never "cheap." If you are budget conscious, a good buy often can be found in the used camera market. You should depend most on a reliable and competent dealer.

Lists Uses for 35mm Camera

Finally, let us consider what many feel to be the most versatile camera for safety engineers and safety directors—the 35mm camera. It can be used to make both photographs and projection slides. A steadily held camera plus proper processing with a fine-grain film will give high quality enlargements of almost any practical size.

Can No. 6 Slide No. G63

Frame No. 12

Figure 1 — Suggested reference system for film slides uses 3" x 5" file card with contact print in upper left corner, slide number in upper right. Negative file location also is shown.

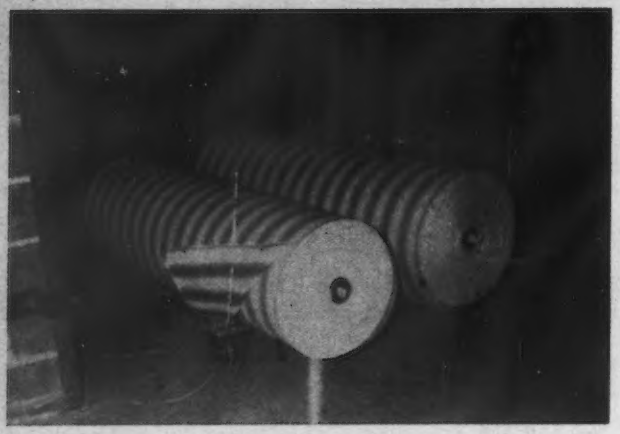


Figure 2—Polaroid print shows dangerous blocking of fire door. Sixty seconds after picture is taken, print is ready for use at safety or foremen's meeting.

when called upon to talk to professional groups, business organizations and other assemblages.

A filing system for ready reference is a "must" for the slide maker. Shown in Figure 1 is a 3″x5″ card used in one system. A contact print is in the upper left corner. The slide number is in the upper right. The negative file is shown alongside the print so that the film may be pulled out of its file to make an enlargement or another slide. When a talk is being prepared, it is not necessary to refer to the whole box of slides. Cards are picked out by referring to the contact prints and slides are located by the slide numbers. Arranging the cards in proper sequence makes it a simple matter to pull the slides and arrange them in the same sequence with a minimum of handling.

When purchasing your first 35mm camera for this purpose, get the advice of a competent camera dealer, tell him what you have in mind and what you plan to spend. Let him recommend the equipment. Here are some suggestions for the 35mm camera based on 20 years of experience using the camera as a tool for safety.

1. Get a good new or used camera with a sharp lens and built in range finder.
2. Get a closeup attachment to enable you to copy charts and reports so that an 8½″x11″ sheet will fill at least one dimension of the negative.
3. Buy film in bulk and, using a daylight film loader, load your own cartridges. Keep on hand a supply of 5-exposure, 10-exposure and 15-exposure cartridges, so that you can get your prints and slides processed with a minimum of time and waste.
4. Two types of film are sufficient; one of average film speed for all outdoor pictures and normal indoor

THE CAMERA *Continued*

To stimulate interest during safety meetings, properly prepared slides of conditions and practices in your plant cannot be matched. Slides of analyses, accident data, progress charts and other material can be presented and discussed with maximum interest. A continuing chart of frequency and severity rates, plotted monthly and shown on the screen, will keep all members of your group posted. They will have a clear mental picture of how they are doing.

To change the pace of a safety meeting and wake up your audience in a hurry while dealing with figures and statistics, you might try slipping in a slide of a group of foremen or safety committee members you prepared previously without announcing your purpose. After a glimpse of this informal slide, the men won't know what is coming next and will be waiting for your next slide in eager anticipation. Since everyone is interested in pictures of themselves, you will stimulate interest and create good will at the same time. Several such slides per year should be adequate.

With a little preparation, right and wrong methods of accident investigation can be shown, giving actual examples from the files. This procedure is a valuable aid in instruction of foremen. If you have a plan of employe indoctrination, formal or informal, material supplemented by recent and informative pictures or slides makes the job interesting for both employe and indoctrinator.

Recommends Slide Library

As time goes on, the man who makes slides for safety meetings builds up a library of slides that eventually enables him to make a talk on practically any phase of industrial safety within his plant. He can use the slides at his own safety meetings and, by proper selection,

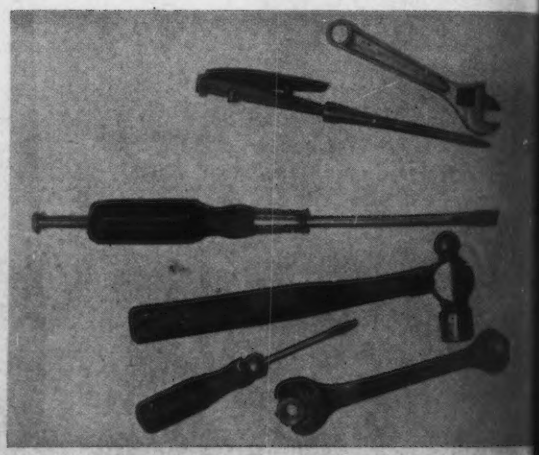


Figure 3—Photograph taken with film-pack camera shows findings of tool box inspection. Negative permits multiple prints, will produce good enlargements.

pictures with flash or flood, and one of the super-speed films to get interior pictures where flash bulbs and flood lights are not permitted or are undesirable.

5. Buy a projector with a 500 or 1000 watt lamp. The stronger the lamp, the less essential it is to have a completely darkened room for showing slides in the daytime.
6. Use a desk type combination projector-viewer to show your slides to small groups of two or three people when it wouldn't be worthwhile to set up your screen.
7. Establish a ready reference system and film storage arrangement and you will have all you need to make practically a hobby out of your profession.

So far, we have considered only black and white photography. Even more interest can be developed in color slides. However, in color photography, expense and time factors build up to the point where you many discard the idea in favor of black and white. But for a long range project, a series of color slides admittedly is more realistic and possibly more interesting than a black and white series.

Discusses Roll-Film Camera

We haven't said anything yet about roll-film cameras, using the 120 or 620 film. These cameras can be used both for color and for black and white. Usually, you wait for exposure of the entire roll for processing. This frequently develops more delay than your short roll of 35mm film or an exposure or two of film pack or cut film. Color slides in this size are more expensive than 35mm slides (2″ x 2″) and require a projector that can handle a 2¼″ x 2¼″ slide. On the other hand, some camera enthusiasts prefer the larger size, feeling that what they lose in speed and economy is made up by size and quality.

Names Other Camera Applications

Most safety directors do, or should, submit periodic reports to management, listing their problems, progress and plans. Including a carefully selected series of photographs pointing up any of these items makes for an interesting report and conveys ideas about as accurately as possible with a minimum amount of wordy explanation.

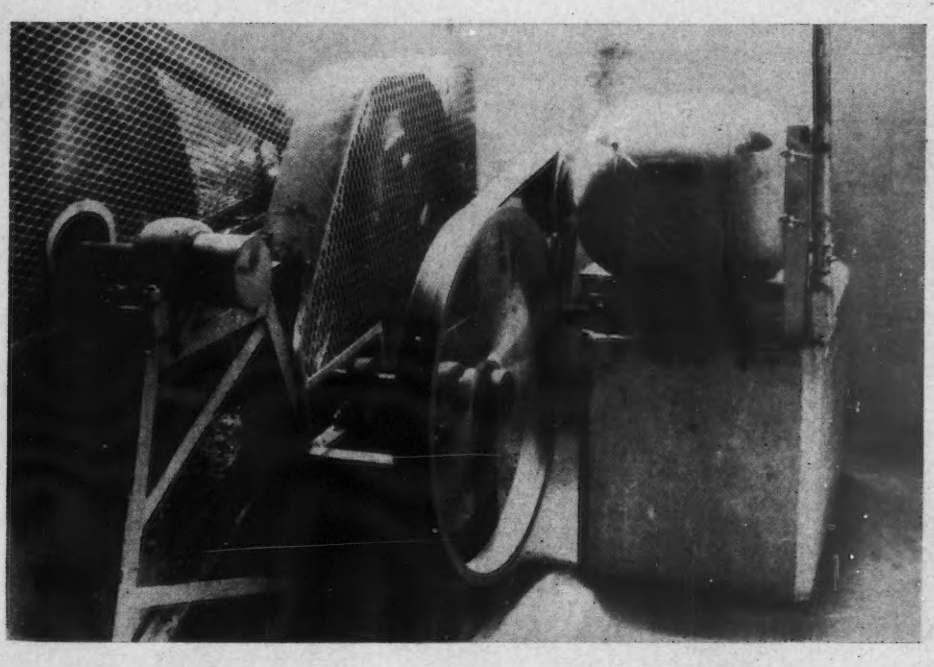
Making slides and photographs is only part of the application of the camera. You also can use it to make up your own pictures for flannelboard talks and flip charts. Flannelboard talks with a combination of word signs, cartoons, cut-outs and photographs taken in your plant are bound to develop the greatest interest.

If you make up your own flip charts, use as many prepared photographs as you can to personalize your message.

If you are dissatisfied with, or tiring of, the safety posters you receive through the mail each month, then use the camera to make your own. A 5″ x 7″ enlargement plus a few well chosen words on an 8½″ x 11″ sheet will do the job effectively, economically, and with a personal approach to your employes. Here again a personalized message has more meaning to your people than a general one made for thousands of plants all over the country.

Another type of poster, for training and retraining programs, shows a particular machine, with instructions or warnings directed at the hazard points. This poster is comparatively permanent, but because your plant may

Figure 4—Camera produces evidence of incomplete guarding which can be used to dramatize safety meeting talk, encourage speedy correction of hazard by responsible department.



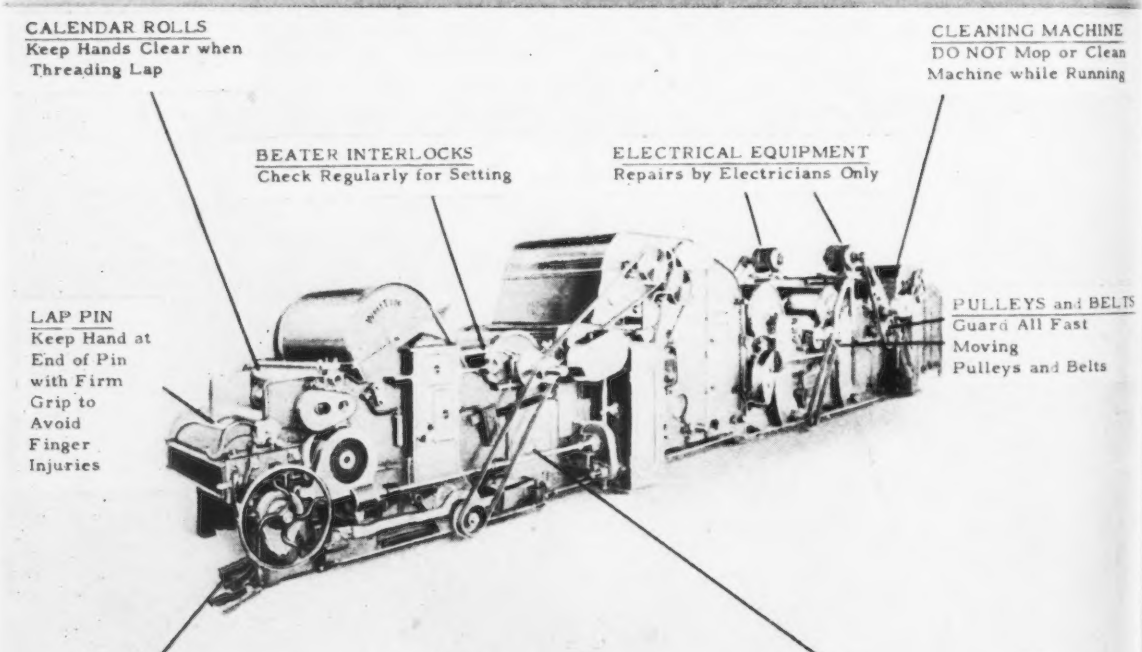
have the only machine of its particular design and because the instructions are based on your own experience and accident history, it becomes for your plant a highly "personalized" poster. These are best kept mounted under glass for preservation and protection.

Gives General Suggestions

Finally, here are some general suggestions to help you, regardless of the type of camera you have or the way you plan to use it.

1. A picture at a speed of less than 1/25th of a second should be made with the camera on a tripod or some other firm support.
2. Compose your pictures with care. This is especially important when making slides, as they are difficult to crop later. Exclude as much of the extraneous background as you can and, unless you want to bring out poor housekeeping, your relations with the department supervisor will be much more cordial if you explain to him what you have in mind, enlist his cooperation and give him the opportunity to clean up the area before you take the picture.
3. Use a shield in front of your flash bulb (for safety). Some of the flash attachments have the shield built right into the bulb holder. Don't use flash or flood lights in hazardous areas where all the other equipment is explosion-proof. Place your camera so that glare from the flash will not bounce off a highly reflective surface right back into the camera lens, ruining your picture.
4. Measure the distance from camera to object with care or use equipment with built-in range finders to get properly focused negatives.
5. Follow the manufacturer's recommendations for camera settings and adjustments, on film ratings and for bulb distances.
6. Get photographic releases when they are dictated by company policy or legal requirements.
7. Have fun with your camera.

Figure 5—Photographs taken in the plant, enlarged and provided with typewritten or hand lettered captions, make original and effective safety posters with high employe interest.


CALENDAR ROLLS
Keep Hands Clear when Threading Lap
CLEANING MACHINE
DO NOT Mop or Clean Machine while Running
BEATER INTERLOCKS
Check Regularly for Setting
ELECTRICAL EQUIPMENT
Repairs by Electricians Only
LAP PIN
Keep Hand at End of Pin with Firm Grip to Avoid Finger Injuries
PULLEYS and BELTS
Guard All Fast Moving Pulleys and Belts
FOOT PEDAL
Place Foot Squarely on Pedal to Keep from Slipping
HANDLING LAPS
Lift Properly with Firm Footing on Dry Floor
CHOKES
DO NOT Remove Chokes with Machine in Motion

SAFETY AT THE PICKER

Figure 1—When you view an orderly, well kept manufacturing aisle, you see the end result of hours of careful planning.

How Important Is HOUSEKEEPING?

by Myron L. Miller

HOW important is housekeeping to accident prevention? Your answer to this question may well vary, depending on your type of operation, on the attention given to mechanization in your plant and perhaps on the limitations you place on the subject of housekeeping.

In recent years we have observed students of safety producing statistics to show that three-quarters or more of our disabling injuries in industry are due to the unsafe behavior of people. Some have arrived at a figure of 80 to 90 per cent or more. If we were to accept these studies without qualification, we would be led to the conclusion that our problem is almost entirely one of controlling the behavior of our people; that with job safety analysis as the basis of proper training and with the right motivation tempered with moderate discipline, we could reasonably expect to solve a major part of our accident prevention problem.

There are those among management people—and many safety engineers—who operate successful accident prevention programs on the premise that orderliness is the prime requisite for preventing accidents. These people build their safety programs largely on the control of physical exposures with emphasis on inspections, preventive maintenance, mechanical guarding and orderly housekeeping.

No fault is to be found particularly with either approach to the problem, for both work environment and workers' behavior have an important bearing on safety performance. Any well rounded program of accident prevention must give consideration to work surroundings

Myron L. Miller is supervisor of safety for East Pittsburgh Works, Westinghouse Electric, and has been employed by Westinghouse for 30 years. A graduate of Iowa State College, he is a member and past general chairman of the Society's Western Pennsylvania Chapter and a past general chairman of the Electrical Equipment Section, National Safety Council.

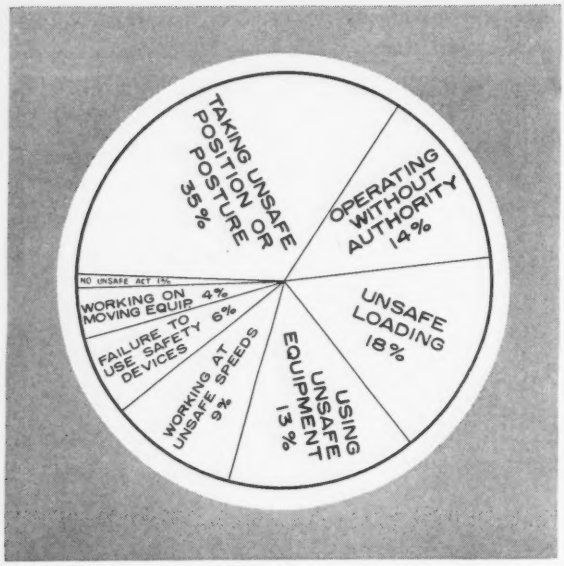

TAKING UNSAFE POSITION OR POSTURE 35%
OPERATING WITHOUT AUTHORITY 14%
UNSAFE LOADING 18%
USING UNSAFE EQUIPMENT 13%
WORKING AT UNSAFE SPEEDS 9%
FAILURE TO USE SAFETY DEVICES 6%
WORKING ON MOVING EQUIP 4%
NO UNSAFE ACT 1%

Figure 2 — Unsafe Acts: Of the 139 disabling cases, every injury except two — almost 99 per cent — had been classified "Unsafe Acts."

as well as work practices. How important, however, is work environment?

Orderly housekeeping has come to be commonplace in our modern manufacturing scheme. Progressive management takes pride in clean, orderly, well lighted and well ventilated plants. Are we likely to take good housekeeping for granted and overlook its true importance as an exposure controller—an injury reducer?

When you view an orderly, well kept manufacturing aisle, you see the end result of hours of careful planning (Figure 1). You see attention to material schedules, balanced operations, orderly flow of finished parts, good lighting, adequate storage and handling facilities and the efficient utilization of man and machine power.

Many industrial injuries have been triggered by unsafe behavior. How many of these injuries had their stage setting in an unsafe surrounding? How many of these injuries would not have occured if the stage had been properly set?

There is no exact mathematical formula by which one can determine accurately the number of injuries prevented by orderly housekeeping. It is possible, however, to study injury cases to discover the elements of disorder

Figure 3—The table below shows a breakdown of disabling injuries, in the 139 cases studied, according to "Injury Type" and "Part of Body Injured."

INJURY TYPE	*PART OF BODY INJURED*								
	Leg	Foot	Trunk	Head	Finger	Hand	Arm	Gen'al	*TOTAL*
STRUCK BY	13	25	6	9	0	0	1	0	54
CAUGHT BETWEEN	5	0	1	0	12	3	1	1	23
STRIKE AGAINST	5	1	5	0	1	4	1	0	17
SLIPS	9	1	9	0	0	1	1	1	22
FALLS	4	0	7	1	0	0	2	3	17
BURNS	1	0	0	0	0	0	1	2	4
ELECTRIC SHOCK	0	0	0	1	0	0	0	1	2
TOTAL	37	27	28	11	13	8	7	8	139

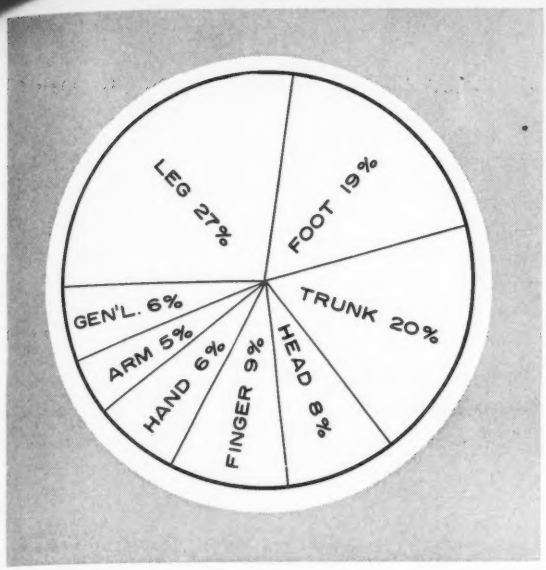


Figure 4—Location of Injury: Sixty-six per cent of the total were from injuries to the feet, legs and trunk.

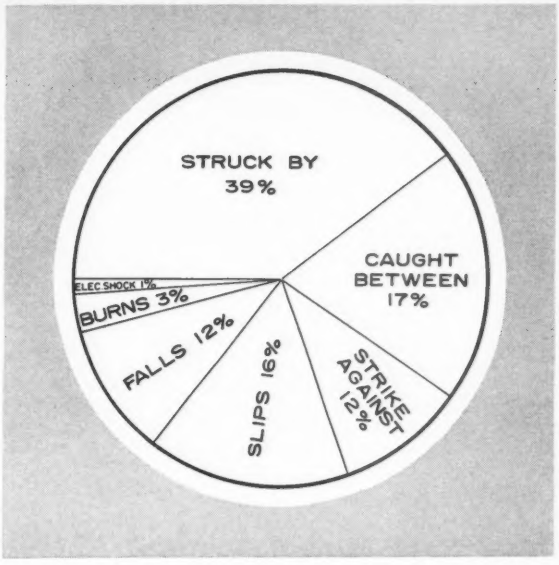


Figure 5—Injury Type: The study showed that 54 workmen — 39 per cent of the total — were struck by something.

involved in the accidents. It is possible to analyze past injury records and, from detailed case studies, determine the direct and contributing causes. It is possible to spot the hazards of poor housekeeping which have contributed to your experience.

Complete records are essential to a good study! These requirements are very well established by ASA Z-16.2, Parts I and II.

The following findings are taken from a study of 139 disabling injuries over a one year period. The purpose of the one year study was to determine where the prior year's accident prevention program had fallen short and to project the program, with needed changes, into the following year.

The first study followed the usual approach. What did the injured employe do to cause the accident? Or what did the injured employe fail to do which permitted the accident to take place? An examination of the records under the classification, "Unsafe Acts," seemed to indicate a significant distribution (Figure 2).

Of the 139 disabling cases, every injury except two—almost 99 per cent—had been classified under "Unsafe Acts." This seemed unusually high and challenged us to look further for contributing causes. We decided first to examine the records for the parts of the body injured and how the injuries occurred.

This study consisted of a simple breakdown of the injuries according to "Injury Type" and by "Part of Body Injured" (Figure 3).

It is significant that the feet, legs and trunk were involved in most of the disabling injuries; however, this could be expected as the plant being studied was in the heavy industry group. The classification by injury type showed a significant grouping. These facts may be presented graphically by pie charts (Figures 4 and 5).

Ninety-two—66 per cent of the total—were from injuries to the feet, legs and trunk. The arms and hands, including fingers, were involved in 28 per cent of the injuries and head injuries accounted for 11 per cent. Six per cent were general in nature.

The study showed that 54 workmen—39 per cent of the total—were struck by something. Twenty-three cases —17 per cent—involved workmen being caught between objects, and in 17 cases—12 per cent of the injuries—workmen bumped against objects. Slips and falls were involved in 28 per cent of the total. Burns and electric shock accounted for four per cent.

By these simple studies two-thirds of the injuries were found to have occurred to the feet, legs and trunk. Those injured were being struck by, caught between, struck against or were involved in slips and falls in a total of 96 per cent of the cases.

By classification according to "Unsafe Physical Conditions" we found defective agencies, inadequate guarding and hazardous arrangement of material and equipment present in 49 per cent of the cases studied.

Taking an unsafe position, unsafe loading and using unsafe equipment were present in two-thirds of the 139 cases.

Following these general classification studies, individual cases were examined in each injury type group. Even though the primary cause of most of the injuries had been judged to be due to human error or "Unsafe Acts," elements of disorder or poor housekeeping were found to be contributing factors in the majority of the 139 cases studied.

Such elements as unsafely piled materials, congestion in work areas, inadequate aisle space, overloading, improper handling, inadequately guarded operations, lack of proper shoring, poorly constructed, slippery, rough

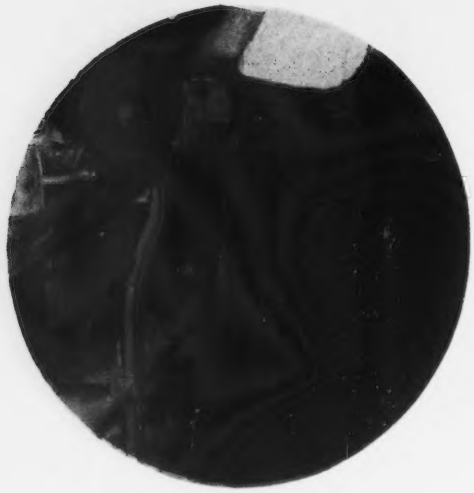


Figure 6—When a workman has his work bench cluttered with parts, there always is possibility of something rolling off or being bumped off his bench and injuring his leg or foot.

or uneven floor surfaces and misplaced materials are typical of the contributing causes.

"Struck By" Injuries: In 54 of the cases studied, the injured persons were struck by falling or moving objects. One of the most common unsafe elements in poor housekeeping is the falling material hazard. For example, when a workman has his work bench cluttered with parts, there is the ever present possibility of something rolling off or being bumped off his bench and injuring his leg or foot (Figure 6). The unsafe practice of placing heavy parts on the edge of a work surface, without proper

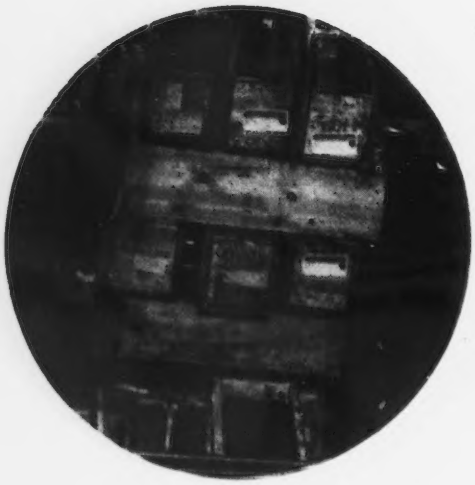


Figure 7—Improperly stacked skids or boxes of heavy material piled up like a leaning tower are potential "fall traps."

blocking or support, sets the stage for a broken foot or leg.

Industrial trucks were involved in 14 of the cases. Irregular floor surfaces, congested and narrow aisleways, improperly loaded material, shifting loads, close working quarters and misplaced material in the aisles were contributing factors in these injuries. When a truck driver is required to dodge through an obstacle course while giving his attention to the efficient movement of a load, he is very likely to overlook the unexpected foot that moves into the path of his truck wheel.

Top-heavy parts left standing, without proper support, in work areas accounted for several disabling injuries. A steel ring leaning against a wall was jarred and fell

Figure 8—Where heavy parts are stored close together in conjested areas, it is impossible for the material handler or hook-on to reach the part from the aisle.

WEST

Figure 9—A hand truck loaded with extruded metal section sitting across an aisle line inflicted a deep and painful laceration in the leg of a passing workman.

over, fracturing a foot. An angle iron frame slid from an uneven pile. A tool part fell out of an overcrowded tool cupboard.

A power driven conveyor, even though it provided an efficient means for handling material, proved to be the source of accidents. When good housekeeping practices were ignored, shop tools left lying on the conveyor and floors permitted to become cluttered with miscellaneous material, the injury toll climbed.

Hazardous arrangement of material in storage areas has been recognized for a long time as one of the most common sources of accident. From Figure 7 you can imagine what is likely to happen when the next layer of boxes of steel laminations is added. Improperly stacked

Figure 10—Metal turnings from lathes, boring mills or drill presses sometimes are razor sharp and are hot.

skids or boxes of heavy material piled up like a leaning tower are potential "fall traps." Uneven or cluttered floors in storage areas add further to this unsafe condition. Where care is not exercised in blocking uneven piles, where heavy materials are piled too high or where material is permitted to accumulate without regard for orderliness, it well can be expected that sooner or later an injury will occur.

"Caught Between" Injuries: Closely related to the hazards of falling objects are the situations which cause people to get caught between equipment, machines or materials. Poor housekeeping makes a substantial contribution to the "Caught Between" hazards.

In the study, 17 per cent of the total were "Caught

Figure 11—A piece of hardware may be harmless in itself but, when left lying on a stair step, it becomes like a roller bearing underfoot.

Between" injuries. Twelve cases, or a little more than 50 per cent, involved handling of material.

Where heavy parts are stored close together in congested areas it is impossible for the material handler or hook-on to reach the part from the aisle (Figure 8). He has no alternative to crawling over the pile. In getting to the part he wants, he is subjected to the possibility of getting his legs caught between parts or catching his fingers when he attempts to hook-on with a crane hoist. Two employes lost fingers due to being caught between the job and the sling.

Closer study of material handling injuries revealed other areas where poor housekeeping features were contributing causes: namely, shifting of material in storage, an overcrowded condition of an elevator, working in confined areas, narrow aisles and inadequate clearances. Also, several machine operating injuries brought out the importance of orderliness.

"Strike Against" Cases: Twelve per cent of the disabling injuries of our study were the result of people bumping against heavy or sharp objects. Poorly stored bar stock and mixed up or cluttered steel storage racks are characteristic of poor housekeeping and common sources of injury. Disorderly bins of steel are constant threats to the safety of the workmen whose task it is to sort out and handle this material. While the hands are exposed primarily, all parts of the body are subject to striking against rough and heavy steel stock.

Several injuries were caused by sharp material sitting in the pathway of workmen. Sharp corners and rough edges left jutting into work areas or along traffic aisles become targets for unsuspecting workmen walking to and from their work places. A hand truck loaded with extruded metal section, sitting across the aisle line, inflicted a deep and painful laceration in the leg of a passing workman (Figure 9). A similar injury occurred when a girl worker, in walking around her work stool, struck her leg against a misplaced pile of sharp laminated finger plates.

Two employes suffered jagged lacerations when they struck against metal turnings which were in the aisle. One of these employes severed a tendon in his ankle. Metal turnings from lathes, boring mills or drill presses sometimes are razor sharp and are hot. Where attention is not given to keeping metal turnings cleaned up, it is not unusual for a machine operator to stumble or trip and fall, cutting his hands as well as his legs (Figure 10).

Handling metal turnings is hazardous and subjects the handler to injury exposures. Failure to use proper handling tools accounted for a number of injuries. Two employes received deep lacerations in the palms of their hands even though they were wearing leather palm gloves. They should have used hooks to load the sharp metal turnings.

"Slips and Falls": Floor and work platform surfaces, improperly cared for, contributed heavily to the 39 injuries, a total of 28 per cent of the cases in the study. Hard steel chips on a metal floor plate or smooth hard surface are almost as effective as a handful of steel ball bearings in providing a fall hazard.

When a work area is so congested it is impossible to position a ladder or a work platform, the workman sometimes resorts to the use of a makeshift platform. If he falls and injures himself, it is true he performed an unsafe act but congestion and poor housekeeping provided the setting.

Misplaced tools, castings scattered on the floor, pieces of cold rolled steel rod lying in the aisle or pieces of two-by-four planks, normally used for blocking, were found to be contributing causes in the slip and fall injury classification.

Slippery machine frames and slippery floors from oil, grease and water leaks provided the sources for some strains and falls.

Stairs at their best are hazardous. They are involved in many falls. Loose articles, left scattered on the steps, magnify this hazard many times. A piece of hardware may be harmless in itself but, when left lying on a stair step, it becomes like a roller bearing underfoot (Figure 11). Many serious injuries occur on stair steps each year. Here housekeeping must be kept at its best.

Conclusions

While our study brought out other contributing causes in each of the "Injury Type" groups, the illustrations given here are sufficient to show that disorderly housekeeping practices were important considerations in our experience.

The findings of the study provided the basis for an improved housekeeping program. The exposures, found to be contributing causes, became the targets for correction and improvement measures.

The findings provided powerful motivating influences for better housekeeping; they gave both management personnel and shop workmen reasons for action. The reasons became personal because the protective measures were aimed at correcting the conditions which had caused injuries to their buddies and to them personally.

The next year following the study, special emphasis was placed on good housekeeping. During that year the overall disabling injury frequency for the plant went down from 3.4 to 1.8, a reduction of 47 per cent. The severity fell from 360 to 90, or a reduction of 72 per cent. This represented a reduction of 50 per cent in frequency and 79 per cent in severity over our five year average. The plant worked one period of 4,035,210 injury free manhours and three divisions received National Safety Council citations. Two were for exceeding 3,000,000 manhours and one for exceeding 1,500,000 manhours free of disabling injuries.

Naturally, the safety engineer should not wait for injuries to point out to him the location of plant hazards. His housekeeping program should be based on a carefully prepared, comprehensive check list of potential hazards.

However, a study of your plant experience can be a valuable aid in making your check list as complete as possible. It will insure that your list includes those items which have given your people trouble. You may use the results of a one year study—or better still, a five or ten year study.

Give your program a purpose. Personalize it with pictures of your own people. Let your management and employes see that orderly housekeeping will benefit them directly and you will get results.

Author teaches workshop safety course which includes classroom lecture and practical demonstration.

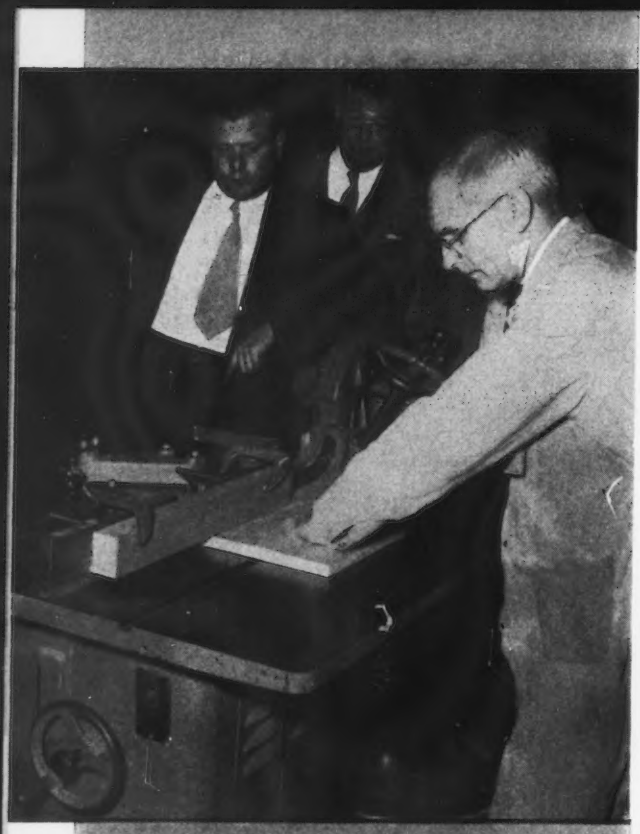
SAFETY *in Do-It-Yourself*

by Nicholas P. Stumpf

Author's Questionnaire Studies Show Need of Students and Adults for Training Courses in Home Workshop Safety

WALK DOWN the streets in your town and count the houses. In two out of three there is a home workshop. Walk down the streets in your town and count the people as the census goes, men, women, children, babes in arms. One out of eight will have a home workshop. In the United States there are 20

Nicholas P. Stumpf has been teaching industrial arts at Maine Township High School for 11 years and has conducted an evening course in home workshop safety for five years. He holds a master's degree from Northwestern University, has been awarded a Laureate Citation by Epsilon Pi Tau, industrial arts teachers' honorary fraternity, for his work in safety education.



Author Stumpf demonstrates safe flat hand shaper operation. Note block clamped to fence, which acts as hold-down and simple, effective guard to protect fingers.

million home workshops and it is estimated that they increase at the rate of 15 per cent a year.

People enter do-it-yourself activities from all walks of life but the middle income group has the greater number of enthusiasts. Since 1948, the beginning of a period of almost steady price rises, the increase in home workshops has been nothing short of amazing. The number one reason given by men for entering the ranks of the do-it-yourselfers is to save money. The wives have been agreeable—perhaps because they want home maintenance jobs done more quickly than is usual when hiring professional repairmen.

Do-it-yourself is becoming a way of life in America for still another reason. There is leisure time in our life today and there is need to use it in satisfying and productive ways. This is the first time in history that man has been able to pursue an artistic or creative urge without starving in an attic. There is good evidence that this new-found freedom is not being wasted in soul-deadening indolence as mechanization increases man's leisure time. A tabulation of the offerings of adult evening schools along the Chicago area's suburban North Shore, made by the author in 1954, showed 57 per cent of the courses were in the creative and manipulative arts and crafts—the list includes everything from cake decorating to carpentry for the home owner.

Do-It-Yourself "Big Business"

Do-it-yourself is not a fad or passing fancy; do-it-yourself is here to stay; it is "big business." In 1953 the do-it-yourself market was estimated at six billion dollars. In 1956 advertising budgets were set and spent, aimed at a 12 billion dollar market. For every dollar of net farm income, someone spends a dollar on a home craft activtity. For every dollar spent on public education, some Mr. Fixit spends a dollar on a do-it-yourself job. The annual national expenditure on home workshop projects would run the Navy Department for more than a year.

The enthusiasm of our amateur craftsmen seemingly knows no bounds. They take hold of almost any project —and accomplish it. In 1956 they worked over 750 million square feet of Douglas Fir plywood. They bought almost three billion dollars worth of building materials. They pasted up 65 per cent of all the wallpaper sold.

And 62 per cent of the single family dwellings are painted on the outside on the average of once every three years by the occupants. Each painter, on the average, uses eight gallons of paint costing 40 dollars. Mothers and daughters do 12 per cent of the outside painting.

The feminine members of the family are busy in other activities too. They cut 400 million dollars worth of piece goods to 85 million paper patterns and stitch it up on 32 million electric sewing machines. They mow about half of the lawns. They say it is fun and good exercise.

People enter the Mr. Fixit ranks from every occupation and with a wide variety of experience. Do-it-yourself literature has grown to meet their needs. In one phase, however, there is a decided lack of information and help. This is in safety education and training in the safe use of the tools employed by amateur craftsmen.

According to the Institute for Safer Living, some 650,000 people suffered disabling injuries in do-it-yourself activities in 1954. Recent checks indicate that the current annual figure is about the same. High climbing ladder accidents are not as numerous as they were but the power mower has taken up the difference. A study on power lawn mower injuries, made by the Georgia State Department of Health, has been published in the Home Safety Review (John N. McClure Jr., M.D., "Power Lawn Mower Injuries," *Home Safety Review*, March, 1957). The article estimates that an annual 50,000 injuries nationally are caused by power mower accidents.

Injury Rate—One Per Minute

Perhaps the total annual do-it-yourself injury figure —650,000—needs further analysis and emphasis. Since there are 525,600 minutes in a year, it means that some homecrafter is hurt in a do-it-yourself project around the house more often than once a minute.

About every two minutes, on the average, someone is hurt in a project that would normally involve the

use of a ladder. Either the ladder was used improperly or a makeshift substitute was used and it proved to be unsafe. About every two minutes, on the average, some craftsman is hurt in a job involving the use of tools, either hand or power driven.

Here is American Mutual's listing of the areas of incidence in greatest degree. It should be noted that most of these areas are closely related to carpentry and home maintenance work. The figures are for 1954.

115,000 carpentry repairs
57,000 cleaning, oiling, painting or repairing gutters.
95,000 repairing broken window panes
76,000 painting exterior of house
31,000 painting inside the house.
47,000 handling storm windows.
11,000 painting or repairing chimneys.
16,400 putting up television antennas.
33,000 pruning trees.
32,000 repairing the roof.
96,700 making furniture for the home.

It is becoming increasingly widely recognized that off-the-job injuries to employes cost industry money. Therefore, industry most certainly has an interest in controlling accidents from do-it-yourself activities. Schools, in fulfilling their responsibilities to their communities, also have an interest in providing safety training for home craftsmen.

The author has made several studies to assess the need for safety education for do-it-yourself craftsmen in the Park Ridge and DesPlaines area of Illinois. These studies have not been projected in any way but they probably show a picture similar to that of many communities in other localities.

Two Categories of Injuries

It will be noted from the above listing that injuries to the novice divide themselves into two broad groupings. These are the falls in home repair and painting operations, and the injuries involving use of tools. The author believes that falls are best controlled by the development of safe attitudes and that no systematic course of training is indicated for this problem. However, in the case of power tools, a systematic course in safe practices will eliminate much of the hazard in their use. The studies therefore are concerned largely with the use of power tools in the home shops of the community.

Most School Students Untrained

The first study at Maine Township High School, Illinois, was made to find out how many students were operating power tools in home workshops without having received training in safe practices. It was assumed that any student enrolled in a shop course would get a good sound basic training in safety and, therefore, shop students were excluded from participation in the survey. Questionnaires were given only to students who indicated that they had home workshops with power tools. Of 1,000 questionnaires, 288 students indicated that they operated power equipment and had never had a course in safe practices. It would seem that there is a sizable group of students in the high school who need safety training in the use of power tools and that sufficient opportunity for training is not being provided by the school. It is the author's experience that there is a lag in meeting this need in most schools.

It must be understood that the author was seeking awareness of conditions existing within a local area and the means of accomplishing the purpose were those possible in the situation. The second investigation was intended to ascertain the age group of the accident victims, in the broadest of terms. The question concerned only school students and adults.

This information was sought from the surgeons who treat the victims. Since these doctors are busy men it was thought best, instead of asking them to complete a written questionnaire, to use the somewhat unscientific method of telephone conversation and estimate. All surgeons indicated that the adult craftsmen were by far the more vulnerable. It was generally stated that few youngsters were treated for injuries due to home workshop activities.

Of adults who visited students' booth at Des Plaines Homes Show, 411 answered questionnaire on workshop safety training. Booklets were distributed on safe use of power tools.

During the summer of 1954, the DesPlaines Chamber of Commerce held a Home Show. A booth was provided for the author to display the work of some of his wood shop students. In questionning adults who visited the booth, the author had an opportunity to study their homecraft activities and learn something of their needs. Again a questionnaire was given only to those who indicated that they had a home workshop with power tools. Of 411 completing the form, 100 stated they had no training in safe practices for the power tools they owned. The most significant fact learned from the study was that 66 per cent of the accident victims were from among the 25 per cent who had no instruction in safe practices. It would seem that a good course in safe practices might prove an effective means of reducing home workshop accidents.

In class on safe use of power tools, Instructor Stumpf shows adult students value of extension table on radial saw to prevent injuries when operator stoops to pick object from floor.

In the light of the needs shown by these studies, the author has established an educational program for safety in do-it-yourself activities at Maine Township High School. The course consists of two evenings of instruction each semester. The first evening is devoted to the safe use of power tools. Movies are shown to help develop sound attitudes toward safety. A lecture, with blackboard illustrations to bring out important points, is given. Actual demonstration points out action and reaction of the machines. Methods of analyzing the various machines are discussed.

The second evening of the course is devoted to safety in home maintenance projects. Safe use of ladders and scaffolding are discussed. Instruction also includes handling of broken glass and safe use of power mowers. The concept of the jig as a safety device on power machinery is given as a final demonstration.

Course Available to All

The author has developed several pamphlets for distribution and reference at home. The course is entirely independent of the high school's regular adult evening classes and day school. Both students and parents are welcome. The course is free and the instructor is not paid for his time. This is entirely a community service. In addition to these scheduled do-it-yourself safety classes, the service also is available to clubs and other organizations requesting it.

Few if any communities have organized clubs of do-it-yourself enthusiasts. Since the school is the center of learning in each community, it is a logical place for safety instruction for these hobbyists. And no group of people is better prepared to give do-it-yourself safety instruction than shop teachers. No place is better equipped for the instruction than school shops.

The American Society of Safety Engineers can contribute in two ways to safety in home workshops. First. Society members can advocate better guarding for the home craft power machines. In many cases present guards are makeshifts of little protective value. Also. sometimes guards are sold as accessories and so, to save a few cents, the craftsman gets the machine without the guard.

Chapters Can Help

Second, the Society chapters can help establish courses in the schools by pointing out the need to their local service clubs, PTA groups and boards of education. Chapters can wield great influence in stimulating shop teachers to set up courses similar to the one at Maine. For teachers entering the field of safety education, who may find it is a discouraging task, chapters can supply friendly encouragement. One of the greatest human drives is the desire for recognition, yet a teacher seldom experiences this stimulation. The Society could stimulate safety instruction in the schools by setting up some means of giving recognition to a teacher who is doing an outstanding job in this area. Also, the actual teaching of classes by Society members could be accomplished in limited degree.

Through the schools, even the smallest community can be reached with do-it-yourself safety courses. Such courses are of great interest to many people because the subject material is related to their hobby. And the courses can have an added value to the safety movement by helping students form safe attitudes that they can carry over into all their daily activities.

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AMERICAN SOCIETY OF SAFETY ENGINEERS

Membership Information

THE American Society of Safety Engineers has established the following classifications of active membership.

MEMBER — To be eligible as a Member an applicant shall be at least thirty years of age and shall be engaged in safety engineering. In addition, he shall have either an engineering or science degree in an accredited college curriculum and the equivalent of eight full years' experience in safety engineering; or he shall have had the equivalent of ten full years' experience in safety engineering.

ASSOCIATE MEMBER — To be eligible as an Associate Member an applicant shall be at least twenty-five years of age and shall be engaged in safety engineering. In addition, he shall have either an engineering or science degree in an accredited college curriculum and the equivalent of three full years' experience in safety engineering; or he shall have the equivalent of five full years' experience in safety engineering; or he shall have either an engineering or science degree in an accredited college curriculum, ten years' experience in professional engineering work and one full year's experience in safety engineering; or he shall have twenty years' experience in engineering work, of which at least ten have been at the professional level, and one full year's experience in safety engineering.

JUNIOR MEMBER — To be eligible as a Junior Member an applicant shall be at least twenty years of age and shall be engaged in safety engineering work, which if pursued the required time will tend to qualify the applicant for the grade of Associate Member. In addition, he shall have either an engineering or science degree in an accredited college curriculum or he shall have had the equivalent of one full year's experience in safety engineering.

AFFILIATE MEMBER — The Society also provides a special classification, that of Affiliate Member, for those not professionally engaged in safety engineering. To be eligible as an Affiliate Member an applicant shall be at least twenty-five years of age and shall have contributed to the advancement of safety engineering through demonstrated achievement in some related field of interest in which he has been engaged for at least three years.

for additional information write to

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